LEPEL

TECHNICAL MANUAL

TR-300

INSTRUCTION MANUAL FOR INDUCTION HEATING GENERATOR

TR-300

WITH TIMER

LEPEL CORPORATION

59-21 QUEENS MIDTOWN EXPRESSWAY, MASPETH, N.Y.C. 11378 • (212)

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ILLUSTRATIONS

Drawing No.	Title
9570704	Generator Installation Diagram
19133040	Schematic Diagram

SECTION 1

1. DESCRIPTION

1.1 GENERAL

The all solid state Lepel Induction Heating Generator, Model TR-300, is specifically designed for industrial heating applications.

The generator follows applicable Occupational Safety and Health Administration (OSHA) specifications.

The generator is certified to meet the requirements of the Federal Communications Commission Rules and Regulations governing industrial heating equipment.

All components are conservatively rated and integral safety devices are employed to protect both the operator and the equipment.

1.2 ELECTRICAL

The electrical system consists of three elements.

1.2.1 CONTROL SYSTEM

The control system consists of a panel meter, contactor, overload switch, safety interlock, toggle switches, pushbuttons, pilot lights etc.

1.2.2 DC SUPPLY

The DC supply converts line voltage, through a single phase isolation transformer and rectifiers to a high DC voltage.

1.2.3 OSCILLATOR

The class C oscillator converts the DC power to RF output power. The tapped tank coil provides the flexibility required to match a wide variety of workpieces and load coils to the generator output.

1.3 STRUCTURAL

The enclosure consists of a heavy duty aluminum cabinet with a removable rear panel and a slip-in chassis.

1.4 CABINET COOLING

A highly efficient and compact fan draws cool ambient air into the cabinet where it is circulated throughout the enclosure to cool the compone

1.5 LOAD COIL COOLING

Depending on requirements, either a self-cooled or water cooled load coil may be furnished.

1.6 DC AMMETER

Indicates the DC current at the output of the rectifiers and consequently the relative RF output power.

1.7 SPECIFICATIONS

RF POWER OUTPUT	300 watts in accordance with IEEE standard #54 rated for continuous duty
OUTPUT FREQUENCY RANGE	200 KHz to 350 kHz
INPUT POWER	625 VA (approximately) 90% power factor single phase 120v 60 Hz (200/220/240, 50/60 Hz available)

WATER SUPPLY (load coil-when applicable)

Flow	1/4 GPM
Pressure (at inlet)	40 PSI to 65 PSI
Temperature (at inlet)	80° F (maximum)

CABINET

Width	12"
Depth	18 1/2"
Height	13 3/4"
Weight	50 lbs. (approximately)

1.3 OPTIONAL EQUIPMENT

1.3.1 FOOTSWITCH

For cycling RF output power.

1.3.2 TIMER

For timing RF output power heating cycles.

1.3.3 TAP SWITCH

For tank coil tap selection from the front panel.

1.3.4 FLEXIBLE LOW LOSS COAXIAL CABLE

For heating a workpiece that is located up to 10 feet from the generator.

1.3.5 TERMINAL BOARD POINTS

For connecting remote control devices to the generator.

1.9 MODE OF OPERATION

Two modes of operation are provided, 'Manual' and 'Footswitch', the selection of which is made through the setting of the 'Mode' toggle switch located on the rear of the chassis.

1.9.1 MANUAL OPERATION - STANDARD

With the toggle switch set to 'Manual', the start/stop pushbuttons on the front panel are used to cycle the generator.

1.9.2 FOOTSWITCH/TIMER OPERATION - OPTIONAL

With the toggle switch set to 'Footswitch', the pushbuttons are inoperative and an optional footswitch is used to cycle the generator.

An optional timer can be used in conjuntion with the footswitch to permit accurate timing of the heating cycles.

SECTION 2

2. UNPACKING AND INSTALLATION

2.1 UNPACKING

Pry off the top of the crate, remove the sides and lift the generator off the base.

2.2 - INSTALLATION

2.2.1 ELECTRICAL

The generator should be connected to an appropriate single phase power source through a grounded receptacle.

2.2.2 LOAD COIL

The load coil should be installed on the RF output terminals with the fasteners provided.

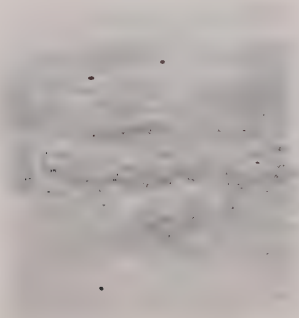
2.2.2.1 Self Cooled

In many applications no supplementary cooling of the load coil is required other than the normal flow of convection air currents.

2.2.2.2 Water Cooled

In those applications where a supplementary source of cooling is required, the load coil should be connected to the local water supply through a water strainer and a shut off valve. (see specifications for water supply requirements).

The water outlet from the load coil should flow to the drain in such a way that the operator can visually monitor the water flow.



SECTION 3

3. SAFETY

It is essential that service and operating personnel be aware of the high voltages present within the enclosure of this generator and that the following safety precautions be observed.

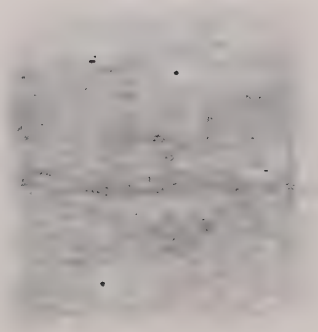
A. When in operation, both the chassis and the rear panel must be fastened in place.

WARNING: If the safety interlock is bypassed and the generator is operating, alternating and direct potentials in excess of 600 volts will be exposed. These voltages may be fatal on contact.

PRECAUTIONS: Load coil and load coil leads.

B. Since high frequency voltages can produce arcs and burns, operators must be instructed not to touch the load coil or load coil leads when the RF output power is on. Appropriate guards must be provided to preclude the possibility of such contact.

Since workpieces may be very hot both during and for some time after heating, the usual caution associated with such objects should be carefully observed.



SECTION 4

4. GENERATOR SET-UP

4.1 PRELIMINARIES

1. Set Tap Switch to No.1. To change tap positions, push knob in, rotate to desired number and release it, making sure that the knob in fully extended.

2. Install the load coil on the RF output terminals and if supplementary cooling is required make the appropriate inlet and outlet water connections (see Sect. 2.2.2.2) and open the local water supply. A free flow of water should be existing into an open drain.

NOTE: If the optional coaxial cable is furnished, fasten one end to the RF output terminals and the other end to the load coil.

4.2 STARTING UP

WARNING: Always set the "Overload Switch" to "OFF" before working on load coil connections

CAUTION: Do not operate the generator if the output current is below 0.5 amperes.

NOTE: Do not apply power to generator unless unit is properly secured in its enclosure and with rear panel in place.

4.2.1 Manual Operation Using Panel Controls

A. Set FOOT SWITCH/PANEL switch on rear of cabinet to PANEL.

B. Set TIMER switch on rear of cabinet to OFF.

C. Set INPUT POWER OVERLOAD switch to ON.

D. Set INPUT POWER ON/OFF switch to ON.
INPUT POWER indicator lamp (amber) lights.

E. Press RF OUTPUT START switch.
RF OUTPUT ON indicator lamp (red) lights and DC AMPERES PLATE meter reads between 1.5 and 4.0 amperes.

F. Press RF OUTPUT STOP switch.
RF OUTPUT ON indicator lamp extinguishes; DC AMPERES PLATE meter reads zero.

4.2.2 Manual Operation Using Footswitch

A. Set FOOT SWITCH/PANEL switch on rear of cabinet to FOOT SWITCH.

B. Set TIME switch on rear of cabinet to OFF.

C. Set INPUT POWER OVERLOAD switch to ON.

D. Set INPUT POWER ON/OFF switch to ON.
INPUT POWER indicator lamp (amber) lights.

E. Press footswitch. RF OUTPUT ON indicator lamp (red) lights and DC AMPERES PLATE meter reads between 1.5 and 4.0 amperes.

F. Release footswitch. RF OUTPUT ON indicator lamp extinguishes; DC AMPERES PLATE meter reads zero.

4.2.3 Automatic Operation Using Footswitch

A. Set FOOT SWITCH/PANEL switch on rear of cabinet to FOOT SWITCH.

B. Set TIME switch on rear of cabinet to ON.

C. Adjust timer to appropriate number of seconds.

D. Set INPUT POWER OVERLOAD switch to ON.

E. Set INPUT POWER ON/OFF switch to ON.
INPUT POWER indicator lamp (amber) lights.

F. Press and release footswitch. RF OUTPUT ON indicator lamp (red) lights and DC AMPERES PLATE meter reads between 0.5 and 4.0 amps. RF OUTPUT ON indicator lamp extinguishes and DC AMPERES PLATE meter needle goes to zero after preset time interval.

4.3 Generator Shutdown Procedure

A. Set INPUT POWER ON/OFF switch to OFF.

B. If water is used to cool the load coil, shut off the water supply.

4.4 PRACTICAL OPERATING CONSIDERATIONS

NOTE: Set tap switch to a higher number to increase output current and to a lower number to decrease it.

Optimum power output occurs when the combined impedances of the load coil and workpiece matches the impedance of the generator.

The maximum permissible output current should not exceed 4.1 amperes. If it does, the 'Overload Switch' will deactivate output power. To decrease the output current set the 'Overload Switch' to 'Off' and set the tap switch to a lower numbered tap. Set the "Overload Switch" to 'Reset-On' and apply output power by pressing the 'Start' pushbutton (or depressing the footswitch).

Never operate the generator if the output current is below its minimum permissible value of 0.5 amperes. To increase output current set the 'Overload Switch' to 'Off', and set the tap switch to a higher numbered tap. Set the 'Overload Switch' to 'On' and apply power by pressing the 'Start' pushbutton (or depressing the footswitch).

Once the desired setting has been established, record it for future use.

When heating ferrous metals, output current may vary throughout the heating cycle.

It may be necessary when setting up the generator, to relocate the tank coil lead several times in order to achieve the optimum heating rate.

Whenever either the load coil or workpiece is changed, some readjustment of the controls may be required.

SECTION 5

5. MAINTENANCE

As with all industrial equipment, the ideal schedule for periodic maintenance is a function of both usage and environment. An initial inspection 3 months after installation and every 6 months thereafter, is suggested:

WARNING: Disconnect all power from the generator before performing any maintenance operations.

A. Check the load coil water connections and hoses for leaks (where applicable).

B. Clean off dust accumulations and film contaminations from the rectifier bridge, transistors and other high voltage components and insulation, which include the ceramic insulators. These maintenance operations are especially important in the presence of corrosive or contaminating vapors.

C. Clean the water strainer screen and check it for breaks (where applicable).

5.1 TROUBLE SHOOTING GUIDE - TR-300

TROUBLE	POSSIBLE CAUSE	CHECK
1. No blower action (115 V lamp is on)	Faulty blower or loose connection	B1
2. Meter reads 0.8 or lower at no load (line lamp is on)	(No oscillation) a) tap switch incorrectly set (set to next lower numbered tap) b) load coil turns too few or too widely spaced	a) S6A
3. No blower action (line lamp is out)	a) fuse blown b) interlock open	F1, F2 S2
4. Line lamp is out (blower running)	Defective light	DS1
5. RF output lamp does not come on when the start button is pressed	a) defective circuit breaker b) defective lamp c) defective footswitch d) defective contactor	CB1 DS2 S3 K1
6. RF output lamp comes on when start button is pressed but goes out when it is released	a) toggle switch incorrectly set to 'Footswitch b) faulty toggle switch	S5 S5
7. Overload reset trips	a) tap switch incorrectly set (set to next lower numbered tap) b) load coil turns too few or too widely spaced	a) S6A

SAFETY

IMPORTANT

THE OUTPUT LEADS FROM THE GENERATOR MUST BE GUARDED TO PREVENT CONTACT OF LEADS BY PERSONNEL.

APPENDIX

HEAT TIMER (BENCH MODEL GENERATORS)

Lepel Stock Number 048-0008.

An ATC electronic timer in the range of 0 to 99.99 seconds is mounted on the front panel of the generator. The timer provides the option of applying RF power to the load coil for a specified (preset) length of time.

The timer contains four (4) digit windows with an associated white toggle lever each. Push the toggle lever down and the digit changes to the next larger number. Push the toggle lever up and the digit changes to the next smaller number. The digit levers are independent of each other and can be operated in any sequence desired.

The footswitch is used to operate the generator in the 'timer mode'. Set the PULSING/CONTINUOUS toggle switch in the PULSING position, and the TIMER/MANUAL toggle switch in the TIMER position. Plug the footswitch into the FOOTSWITCH receptacle, and depress to apply heat to the workpiece for the preset time.

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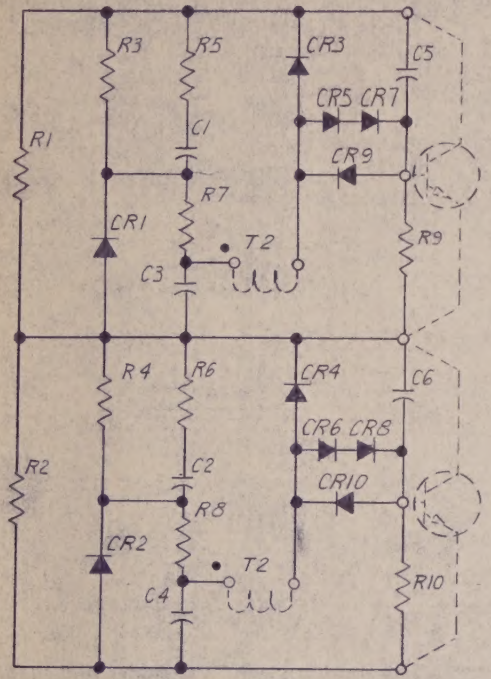
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		R9+R10 WERE 47Ω ½W ECO-85011	2-20-85	SPL
B		C5+C6 WERE 330PS 6KVDC ECO-85020	3-22-85	SPL



NOTE:
DOTTED LINES INDICATE COMPONENTS NOT INCLUDED IN PCB.

REF DESIG	LEPEL STOCK NO.	DESCRIPTION	SPECIFICATION
C1	007-0101	CAPACITOR,	.15 μF ± 10%, 400V.
C2	007-0101	"	.15 μF ± 10%, 400V.
C3	007-0210	"	.068 μF ± 10%, 400V.
C4	007-0210	"	.068 μF ± 10%, 400V
C5	007-0224	, CER. DISC.	330 PF, 3KV.
C6	007-0224	CAPACITOR, CER. DISC.	330 PF, 3 KV.
CR1		RECTIFIER, DIODE	400V, 3A.
THRU	016-0049 (10PCS)	RECTIFIER, DIODE	400V, 3A.
CR10		RECTIFIER, DIODE	400V, 3A.
R1	038-0100	RESISTOR,	4.7 KΩ, 2W.
R2	038-0100	"	4.7 KΩ, 2W.
R3	038-0213	, AXIAL	2KΩ ± 5%, 5W.
R4	038-0213	"	2 KΩ ± 5%, 5W.
R5	038-0211	"	350 Ω ± 10%, 10W.
R6	038-0211	, AXIAL	350 Ω ± 10%, 10W.
R7	038-0199	, FIXED	100Ω 5%, 2W.
R8	038-0199	, FIXED	100Ω 5%, 2W
R9	038-0218	, CARBON	100Ω 5%, ½W
R10	038-0218	RESISTOR, CARBON	100Ω 5%, ½W

3690076	
3690077	TR300
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES
TOLERANCE ON: FRACTIONS ± | DECIMALS ± | ANGLES ±

DRAWN BY R Thomas DATE 10-22-87
CHECKED SPL DATE
APPROVED FOR MFG DATE
ENGINEER SPL DATE 10-26-87

NAME SCHEMATIC DIAGRAM OSCILLATOR BOARD TR300

MATERIAL
FINISH

DWG SIZE B | DRAWING NO. 19140720 | REV B
SCALE — | SHEET 1 OF 1

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